

CLAIMS

1. A continuously variable ratio transmission unit of rolling traction type, comprising

a pair of races between which torque is transmitted by at least one roller, the roller being movable to provide for variation in the transmission ratio and being subject to an adjustable roller reaction force by a roller actuator,

a traction loading actuator arranged to urge the rollers and discs into engagement with each other with a force which is varied in sympathy with the roller reaction force during normal variator operation,

and a pre-loading arrangement which is arranged to urge the rollers and discs into engagement with each other at least during a cold start,

wherein the pre-loading arrangement is adapted to apply a pre-loading force which is reduced with increasing operating temperature.

2. A continuously variable ratio transmission unit as claimed in claim 1 wherein the pre-loading arrangement comprises a pre-load adjustment actuator having a working chamber in which a body of thermally expansive material is confined, such that force exerted by the pre-load adjustment actuator corresponds to pressure within the working chamber and varies with operating temperature.

3. A continuously variable ratio transmission as claimed in claim 2 wherein the pre-load adjustment actuator comprises a piston and cylinder arrangement defining the working chamber.

4. A continuously variable ratio transmission unit as claimed in claim 2 or claim 3 wherein the pre-loading arrangement further comprises a pre-stressed spring arranged to provide the pre-loading force, the pre-load adjustment actuator being arranged to act in opposition to the spring and so to relieve the pre-loading force as operating temperature increases.

5. A continuously variable ratio transmission unit as claimed in any of claims 2, 3 or 4 wherein the end load adjustment actuator is arranged to act upon one of the races and is mounted to rotate therewith.

6. A continuously variable ratio transmission unit as claimed in any of claims 2, 3, 4 or 5 wherein the end load adjustment actuator and the race upon which it acts are mounted upon a common shaft, the race being capable of movement along the shaft and the actuator comprising a disc which is fixed relative to the shaft and a piston movable along the shaft, the working chamber being defined therebetween.

7. A continuously variable ratio transmission unit as claimed in claim 6 wherein a sleeve disposed around the disc and piston serves as a cylinder within which the piston forms a sealed, sliding fit and also serves to couple the movable race to the piston.

8. A continuously variable ratio transmission unit as claimed in any preceding claims wherein the pre-loading arrangement and the traction loading

actuator act on different races.

9. A continuously variable ratio transmission as claimed in claim 4 wherein, in addition to the pre-loading spring, a second spring is provided whose force is not relieved by the pre-load adjustment actuator, the second spring ensuring a minimum traction loading force.

10. A continuously variable ratio transmission unit substantially as herein described with reference to, and as illustrated in, accompanying Figure 1 or Figure 3.